In Reply Refer To:
SWR-01-SA-6002:HLB

Mr. Michael G. Ritchie
Division Administrator
Federal Highway Administration
980 Ninth Street, Suite 400
Sacramento, California 95814-2724

Dear Mr. Ritchie:

This document transmits the National Marine Fisheries Service's (NOAA Fisheries) biological opinion (Enclosure 1) based on our review of the proposed Ord Ferry Bridge Seismic Retrofit Project located in Butte County, California, and its effects on federally listed endangered Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), threatened Central Valley spring-run Chinook salmon (*O. tshawytscha*), threatened Central Valley steelhead (*O. mykiss*), and the designated critical habitat of Sacramento River winter-run Chinook salmon in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq*.). Your April 23, 2002, request for formal consultation was received on April 24, 2002.

This biological opinion is based on information provided in the April 2001 biological assessment (BA) for the Ord Ferry Bridge Seismic Retrofit Project, the September 5, 2002, amendment to the BA, the draft November 2002 Initial Study/Mitigated Negative Declaration, discussions held at an August 20, 2002, meeting in Marysville with representatives of the California Department of Transportation (Caltrans), the Butte County Department of Public Works (County), NOAA Fisheries, and the U.S. Fish and Wildlife Service (FWS), and telephone conversations between Howard Brown of NOAA Fisheries and Suzanne Melim of Caltrans. A complete administrative record of this consultation is on file at the NOAA Fisheries Sacramento Field Office.

Based on the best available scientific and commercial information, the biological opinion concludes that this project is not likely to jeopardize the above species or adversely modify critical habitat. NOAA Fisheries has also included an incidental take statement with reasonable and prudent measures and non-discretionary terms and conditions that are necessary and appropriate to minimize incidental take associated with the project.

Also enclosed are Essential Fish Habitat (EFH) Conservation Recommendations for Pacific salmon as required by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) as amended (16 U.S.C. 1801 *et seq.;* Enclosure 2). This document concludes that the Ord Ferry Road Bridge Seismic Retrofit Project will adversely affect the EFH of Pacific Salmon in the action area and adopts the ESA Conservation Recommendations of the biological opinion as the EFH Conservation Recommendations.

Section 305(b)4(B) of the MSA requires FHWA to provide NOAA Fisheries with a detailed written response within 30 days, and 10 days in advance of any action, to the EFH conservation recommendations, including a description of measures adopted by FHWA for avoiding, minimizing, or mitigating the impact of the project on EFH (50 CFR ' 600.920[j]). In the case of a response that is inconsistent with our recommendations, FHWA must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NOAA Fisheries over the anticipated effects of the proposed action and the measures needed to avoid, minimize, or mitigate such effects.

If you have any questions regarding this correspondence please contact Mr. Howard Brown in our Sacramento Area Office, 650 Capitol Mall, Suite 8-300, Sacramento, CA 95814. Mr. Brown may be reached by telephone at (916) 930-3608 or by Fax at (916) 930-3629.

Sincerely,

Rodney R. McInnis
Acting Regional Administrator

Enclosures (2)

cc: NMFS-PRD, Long Beach, CA
Stephen A. Meyer, ASAC, NMFS, Sacramento, CA

Enclosure 1

BIOLOGICAL OPINION

ACTION AGENCY:	Federal Highway Administration
ACTIVITY:	Ord Ferry Road Bridge Seismic Retrofit Project
CONSULTATION CONDUCTED BY:	Southwest Region, National Marine Fisheries Service
DATE ISSUED:	

I. CONSULTATION HISTORY

On June 25, 2001, the Federal Highway Administration (FHWA) requested informal consultation with the National Marine Fisheries Service (NOAA Fisheries) for the Ord Ferry Road Bridge Seismic Retrofit Project (Bridge Retrofit Project) in Butte County, California.

On July 30, 2001, NOAA Fisheries requested additional information related to the Bridge Retrofit Project, and notified FHWA of the potential for incidental take of endangered Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), threatened Central Valley spring-run chinook salmon (CV spring-run Chinook salmon; *O. tshawytscha*), and threatened Central Valley steelhead (CV steelhead; *O. mykiss*) due to their presence in the project area during the proposed in-water work period.

On April 23, 2002, FHWA initiated formal consultation for the Bridge Retrofit Project. The initiation package included a biological assessment (BA) that evaluated potential project related effects on listed anadromous fish and their designated critical habitat as well as essential fish habitat (EFH) for Pacific Salmon.

On August 20, 2002, a meeting was held in Marysville with representatives of the California Department of Transportation (Caltrans), the Butte County Department of Public Works (County), NOAA Fisheries, and the U.S. Fish and Wildlife Service (FWS). The primary objective of the meeting was to identify acceptable work windows and other measures necessary to avoid, minimize, and compensate for project related effects to listed species.

On September 5, 2002, Caltrans submitted a letter to NOAA Fisheries amending the BA with supplemental information that was discussed in the August 20, 2002 meeting. This letter described the construction schedule and access routes, and included a revised work window proposal.

On December 11, 2002, NOAA Fisheries received the draft November 2002 Initial Study/Mitigated Negative Declaration for the Bridge Retrofit Project. This document provided NOAA Fisheries with the latest detailed project description.

This biological opinion is based on information provided in the BA, the September 5, 2002 amendment to the BA, the draft November 2002, Initial Study/Mitigated Negative Declaration, discussions held at the August 20, 2002 meeting, and telephone conversations between Howard Brown of NOAA Fisheries and Suzanne Melim of Caltrans. A complete administrative record of this consultation is on file at the NOAA Fisheries Sacramento Field Office.

II. DESCRIPTION OF THE PROPOSED ACTION

A. Project Activities

FHWA, in cooperation with Caltrans and the County, proposes to seismically retrofit the Ord Ferry Bridge over the Sacramento River at river mile (RM) 184. The Ord Ferry Bridge is located approximately seven miles south of Hamilton City on Ord Ferry Road, in Butte County. The purpose of the Bridge Retrofit Project is to improve user safety. Construction is expected to begin in 2006 and last for three construction seasons, with in-water work limited to the period from May 15 through October 15. Construction is expected to occur 40 to 60 hours per week from 6:00 am to 4:00 pm, although some evening and weekend work may be required.

The Bridge Retrofit Project will involve installing steel column casings and retrofitting the footings on six of eight existing bridge columns. Two columns and footings will be retrofitted during each year of construction. Cofferdams will be established around the existing bridge columns by driving sheet pile into the river substrate. Once the cofferdam is established, the water within the contained area will be pumped and river substrate will be excavated to expose the footing. All pumped and excavated material will be transferred to settling ponds built at disturbed areas beneath the bridge and above Sacramento River mean high water level. Settling ponds will be constructed using a combination of straw bails, plastic, and earthen materials. Excavated substrate will be allowed to dry before being disposed offsite. Pumped water will be retained in the settling ponds and prevented from re-entering the Sacramento River. The footings will then be retrofitted by driving bearing piles, placing reinforcement steel, and pouring concrete. Concrete and concrete washings will not be allowed to enter the Sacramento River.

Access to the in-water portion of the project area will be from the southwest and northeast quadrants. The southwest access site is the old Ord Ferry Ramp, and the northeast access site is on the levee adjacent to the bridge. Access sites will be improved to accommodate construction equipment. These improvements will include removal of up to one-half acre of riparian vegetation. Either a temporary floating platform, or a combination of a temporary floating platform and a temporary trestle will be used to access the in-water columns and will be used to support the crane, vibratory hammer, and construction materials. The temporary floating platform would extend eastward from the western bank of the river at the old Ord Ferry Ramp. Sections would be trucked to the site and assembled. The temporary trestle would be assembled on steel pilings that are driven into the riverbed. A temporary bridge may be placed across a small side channel between the old Ord Ferry Ramp and the mid-channel island. The platform decking of any temporary structure would be removed prior to seasonal high flows at the end of the in-water construction period. If any fill is placed to support the temporary bridge, it will consist of clean, washed, round rock approximately 2 inches in diameter. Placement of this bridge will meet the criteria outlined in the NOAA Fisheries Southwest Region Guidelines for Salmonid Passage at Stream Crossings (http://swr.ucsd.edu/hcd/NMFSSCG.PDF). The proposed staging sites are flat, unvegetated areas that are outside of the Sacramento River mean high water mark.

B. Proposed Conservation Measures

To avoid, minimize, and compensate for potential impacts to Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and CV steelhead, FHWA and Caltrans have integrated additional design features into the project description. These measures include the following:

1. All in-water work, including pile driving, will be restricted to the period from May 15 to October 15 of each construction year.

2. All removed riparian vegetation will be revegetated on-site, and in-kind, at a 6:1 ratio.

3. The area within cofferdams will be calculated and compensated at a 6:1 ratio by acquiring riverbank property 15 miles downstream near the Butte City Bridge. The acquired riverbank parcel will not be protected or stabilized with revetment. Preliminary calculations estimate that a total of 0.36 acres of riverbed will be contained within cofferdams which will require the purchase of 2.16 acres at the Butte City Bridge.

4. Best Management Practices (BMPs) will be implemented that are necessary to minimize the risk of sedimentation, turbidity, and hazardous material spills. Applicable BMPs will include permanent and temporary erosion control measures, including use of straw bales, mulch or wattles, silt fences, filter fabric, spill remediation material such as absorbant booms, and ultimately seeding and revegetating.

5. The contractor will be required to develop a Spill Prevention Plan (SPP) and a Storm Water Pollution Prevention Plan (SWPPP). Spill prevention measures will include stockpiling absorbant booms, staging hazardous materials at least 25 feet away from the river, and maintaining and checking construction equipment to prevent fuel and lubrication leaks. SWPPP measures will utilize applicable BMPs such as use of silt fences, straw bales, other methods necessary to minimize storm water discharges associated with construction activities.

6. The project will adhere to Regional Water Quality Control Board (Regional Board) water quality objectives for the Sacramento River Basin. These objectives require that project discharge cannot exceed 1 Nephelometric Turbidity Unit (NTU) when natural turbidity is between 0 and 5 NTUs, 20 percent of natural turbidity levels when natural turbidity is between 5 and 50 NTUs, 10 NTUs when natural turbidity is between 50 and 100 NTUs, or 10 percent when natural turbidity is greater than 100 NTUs. NTUs are an indicator of the amount of light that is scattered and absorbed by suspended particles. A biological monitor will supervise construction activities within the Sacramento River channel and if objectives are exceeded, in-water construction will stop until objectives can be met.

7. A fish salvage plan will be prepared to rescue juvenile salmonids trapped inside of cofferdams.

C. Description of the Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR § 402.02). The action area, for the purposes of this biological opinion, is located along the Sacramento River, at the Ord Ferry Bridge, seven miles south of Hamilton City, at RM 184. The action area encompasses an area that begins 600 meters upstream of the bridge and extends 600 meters downstream of the bridge. This area was selected because it represents the upstream and downstream extent of anticipated acoustic effects from pile driving.

III. STATUS OF THE SPECIES AND CRITICAL HABITAT

This biological opinion analyzes the effects of the Ord Ferry Road Bridge Retrofit Project on the following threatened and endangered species:

Sacramento River winter-run Chinook salmon - endangered
CV spring-run Chinook salmon - threatened
CV steelhead - threatened

In addition, the action area is within the designated critical habitat for Sacramento River winter-run Chinook salmon.

A. Sacramento River Winter-Run Chinook Salmon

Sacramento River winter-run Chinook salmon originally were listed as threatened in November, 1990 (55 FR 46515). This status was reclassified as endangered in January, 1994 (59 FR 440) due to a continuing decline and increased variability of run sizes since their listing as a threatened species, expected weak returns as a result of two small year classes in 1991 and 1993, and continuing threats to the population. NOAA Fisheries recognized that the population had dropped nearly 99 percent between 1966 and 1991, and despite conservation measures to improve habitat conditions, the population continued to decline (57 FR 27416). A draft recovery plan was published in August 1997 (NOAA Fisheries 1997).

Critical habitat for winter-run Chinook salmon was designated on June 16, 1993 and includes the Sacramento River from Keswick Dam (RM 302) downstream to Chipps Island (RM O) at the westward margin of the Sacramento-San Joaquin Delta; all waters from Chipps Island westward to the Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of the San Francisco Bay (north of the San Francisco Bay Bridge) from San Pablo Bay to the Golden Gate Bridge. The critical habitat designation identifies those physical and biological features of the habitat that are essential to the conservation of the species and that may require special management consideration or protection. Within the Sacramento River this includes the river water, river bottom (including those areas and associated gravel used by winter-run Chinook salmon as spawning substrate), and adjacent riparian zone used by fry and juveniles for rearing.

Winter-run Chinook salmon historically spawned in the headwaters of the McCloud, Pit, and Little Sacramento rivers and Hat and Battle creeks. Construction of Shasta Dam in 1943 and Keswick Dam in 1950 blocked access to all of these waters except Battle Creek, which is blocked by a weir at the Coleman National Fish Hatchery and other small hydroelectric facilities (Moyle 1989, NOAA Fisheries 1997). Most of the current winter-run Chinook salmon spawning and rearing habitat exists between Keswick Dam and Red Bluff Diversion Dam (RBDD) in the Sacramento River.

Adult winter-run Chinook salmon enter San Francisco Bay from November through June (Hallock and Fisher 1985) and migrate past RBDD from mid-December through early August (NOAA Fisheries 1997). The majority of the run passes RBDD from January through May, and peaks in mid-March (Hallock and Fisher 1985). Generally, winter-run Chinook salmon spawn from near Keswick dam, downstream to Red Bluff. Spawning occurs from late April through mid-August with peak activity between May and June. Eggs and pre-emergent fry require water temperatures at or below 56º F for maximum survival during the spawning and incubation period (Boles *et al.* 1988)). Fry emerge from mid-June through mid-October and move to river margins to rear. Emigration past RBDD may begin in mid-July, typically peaks in September, and can continue through March in dry years (NOAA Fisheries 1997, Vogel and Marine 1991). From 1995 to 1999, all winter-run Chinook salmon outmigrating as fry passed RBDD by October, and all outmigrating pre-smolts and smolts passed RBDD by March (Martin *et al.* 2001).

Since 1967, the estimated adult winter-run Chinook salmon population ranged from 186 in 1994 to 117,808 in 1969 (DFG 2002). The estimate declined from an average of 86,000 adults in 1967-1969 to only 2,000 by 1987-1989, and continued downward to an average 830 fish in 1994-1996. Since then, estimates have increased to an average of 3,136 fish for the period of 1998-2001. Winter-run Chinook salmon abundance estimates and cohort replacement rates since 1986 are shown in Table 1. Although the population estimates from the RBDD counts display broad fluctuation since 1986 (186 in 1994 to 5,523 in 2001), there is an increasing trend in the five year moving average over the last five year period (491 from 1990-1994 to 2609 from 1997-2001), and a generally stable trend in the five year moving average of cohort replacement rates. The 2001 run was the highest since the listing, with an estimate of 5,521 adult fish.

Numerous factors have contributed to the decline of winter-run Chinook salmon by degrading spawning, rearing, and migration habitats. The primary impacts include warm water releases from Shasta Dam, juvenile and adult passage constraints at RBDD, water exports in the south Sacramento-San Joaquin Delta, heavy metal contamination from Iron Mountain Mine, and entrainment in a large number of unscreened or poorly screened water diversions. Secondary factors include smaller water manipulation facilities and dams, loss of rearing habitat in the lower Sacramento River and Sacramento-San Joaquin Delta from levee construction, marshland reclamation, and interaction with and predation by introduced species (NOAA Fisheries 1997).

Table 1. Winter-run Chinook salmon population estimates from Red Bluff Diversion Dam counts, and corresponding cohort replacement rates for years since 1986.

Year	Population Estimate	5 Year Moving Average of Population Estimate	Cohort Replacement Rate	5 Year Moving Average of Cohort Replacement Rate
1986	2596	-	0.27	-
1987	2186	-	0.2	-
1988	2886	-	0.07	-
1989	697	-	1.78	-
1990	431	1759	0.9	0.64
1991	211	1282	0.88	0.77
1992	1241	1093	1.04	0.93
1993	387	593	3.45	1.61
1994	186	491	4.73	2.2
1995	1287	662	2.33	2.49
1996	1337	888	1.71	2.65
1997	880	815	1.54	2.75
1998	3005	1339	1.84	2.43
1999	2288	1759	-	-
2000	1352	1772	-	-
2001	5521	2609	-	-

Since the listing of winter-run Chinook salmon, many habitat problems that led to the decline of the species have been addressed and improved through restoration and conservation actions.

The impetus for initiating restoration actions stem primarily from ESA temperature, flow, and diversion requirements (e.g., NOAA Fisheries'1993 biological opinion addressing the effects of the Bureau of Reclamation's [BOR] operation of the Central Valley Project [CVP] and DWR's operation of the State Water Project [SWP] on winter-run Chinook salmon); State Water Resources Control Board (SWRCB) orders requiring compliance with Sacramento River water temperature objectives; a 1992 amendment to the authority of the CVP through the Central Valley Project Improvement Act (CVPIA) to give fish and wildlife equal priority with other CVP objectives (e.g., in section 3406[b][2], establishment of a water account to supplement CVPIA minimum flow requirements); fiscal support of habitat improvement projects from the CALFED Bay-Delta Program (e.g., installation of the Glenn-Colusa Irrigation District [GCID] fish screen, establishment of an Environmental Water Account [EWA], etc.); and EPA pollution control efforts to alleviate acidic mine drainage from Iron Mountain Mine.

Recent trends in winter-run Chinook salmon abundance and cohort replacement are positive and indicate some recovery since the listing. However, the population remains particularly susceptible to extinction because of the reduction of their genetic pool to one population.

B. Central Valley Spring-Run Chinook Salmon

NOAA Fisheries listed the Central Valley spring-run Chinook salmon evolutionarily significant unit (ESU) as threatened on September 16, 1999 (64 FR 50394). Historically, spring-run Chinook salmon were the dominant run in the Sacramento River Basin, occupying the middle and upper elevation reaches (1,000 to 6,000 feet) of most streams and rivers with sufficient habitat for over-summering adults (Clark 1929). Clark estimated that there were 6,000 miles of salmon habitat in the Central Valley Basin (much which was high elevation spring-run Chinook salmon habitat) and that by 1928, 80 percent of this habitat had been lost. Yoshiyama *et al.* (1996) determined that, historically, there were approximately 2,000 miles of salmon habitat available prior to dam construction and mining and that only 18 percent of that habitat remains.

Adult spring-run Chinook salmon enter the Delta from the Pacific Ocean beginning in January and enter natal streams from March to July. In Mill Creek, Van Woert (1964) noted that of 18,290 spring-run Chinook salmon observed from 1953 to 1963, 93.5 percent were counted between April 1 and July 14, and 89.3 percent were counted between April 29 and June 30.

During their upstream migration, adult Chinook salmon require streamflows sufficient to provide olfactory and other orientation cues used to locate their natal streams. Adequate streamflows are also necessary to allow adult passage to upstream holding habitat. The preferred temperature range for upstream migration is 38E F to 56E F (Bell 1991; DFG 1998).

Upon entering fresh water, spring-run Chinook salmon are sexually immature and must hold in cold water for several months to mature. Typically, spring-run Chinook salmon utilize mid-to high-elevation streams that provide appropriate temperatures and sufficient flow, cover, and pool depth to allow over-summering. Spring-run Chinook salmon may also utilize tailwaters below dams if cold water releases provide suitable habitat conditions. Spawning occurs between September and October and, depending on water temperature, emergence occurs between November and February.

Spring-run Chinook salmon emigration is highly variable (DFG 1998). Some may begin outmigrating soon after emergence, whereas others oversummer and emigrate as yearlings with the onset of increased fall storms (DFG 1998). The emigration period for spring-run Chinook salmon extends from November to early May, with up to 69 percent of young-of-the-year outmigrants passing through the lower Sacramento River between mid-November and early January (Snider and Titus 2000). Outmigrants are also known to rear in non-natal tributaries to the Sacramento River, and the Delta (DFG 1998).

Chinook salmon spend between one and four years in the ocean before returning to their natal streams to spawn (Myers *et al.* 1998). Fisher (1994) reported that 87 percent of Chinook trapped and examined at RBDD between 1985 and 1991 were three-year-olds.

Spring-run Chinook salmon were once the most abundant run of salmon in the Central Valley (Campbell and Moyle 1992) and were found in both the Sacramento and San Joaquin drainages. More than 500,000 spring-run Chinook salmon were caught in the Sacramento-San Joaquin commercial fishery in 1883 alone (Yoshiyama *et al*. 1998). The San Joaquin populations were essentially extirpated by the 1940s, with only small remnants of the run that persisted through the 1950s in the Merced River (Hallock and Van Wort, 1959, Yoshiyama *et al*. 1998). Populations in the upper Sacramento, Feather, and Yuba Rivers were eliminated with the construction of major dams during the1950s and 1960s. Naturally spawning populations of spring-run Chinook salmon are currently restricted to accessible reaches of the upper Sacramento River, Antelope Creek, Battle Creek, Beegum Creek, Big Chico Creek, Butte Creek, Clear Creek, Deer Creek, Mill Creek, Feather River, and the Yuba River (DFG 1998).

Since 1969, the spring-run Chinook salmon ESU has displayed broad fluctuations in abundance, ranging from 1,403 in 1993 to 25,890 in 1982 (DFG unpublished data, 2003). The average abundance for the ESU was 12,590 for the period of 1969 to 1979, 13,334 for the period of 1980 to 1990, and 6,554 from 1991 to 2001. Evaluating the abundance of the ESU as a whole, however, complicates trend detection. For example, although the mainstem Sacramento River population appears to have undergone a significant decline, the data are not necessarily comparable because coded wire tag information gathered from fall-run Chinook salmon returns since the early 1990s has resulted in adjustments to ladder counts at RBDD that have reduced the overall number of fish that are categorized as spring-run Chinook salmon (Colleen Harvey-Arrison, DFG, pers. comm., 2003).

Sacramento River tributary populations in Mill, Deer, and Butte Creeks are probably the best trend indicators for spring-run Chinook salmon abundance. These streams have shown positive escapement trends since 1991, yet recent escapements to Butte Creek, including 20,259 in 1998, 9,605 in 2001 and 8,785 in 2002, are responsible for the magnitude of tributary abundance (DFG 2002 and DFG unpublished 2003). Although recent tributary production is promising, annual abundance estimates display a high level of fluctuation and the overall number of CV spring-run Chinook salmon remains well below estimates of historic abundance.

The initial factors that led to the decline of spring-run Chinook salmon were related to the loss of upstream habitat behind impassible dams. Since this initial loss of habitat other factors have contributed to the decline of Chinook salmon and affected the ESU's ability to recover. These factors include a combination of physical, biological, and management factors such as climatic variation, water management, hybridization, predation, and harvest (DFG 1998).

Weather and ocean conditions in California can vary substantially from year to year. During the drought of 1984 to 1992, spring-run Chinook salmon populations declined substantially. Reduced flows resulted in warm water temperatures and impacted adults, eggs, and juveniles. For adult spring-run Chinook salmon, reduced instream flows delayed or completely blocked access to holding and spawning habitats. Water management operations, including reservoir releases, and unscreened and poorly screened diversions in the Sacramento River and it's tributaries, and the Sacramento-San Joaquin Delta compounded drought-related problems by reducing river flows, warming river temperatures, and entraining juvenile spring-run Chinook salmon.

Hatchery practices as well as spatial, and temporal overlaps of habitat use and spawning activity between spring- and fall-run led to the hybridization and homogenization of some subpopulations (DFG 1998). As early as the 1960s, Slater (1963) observed that early fall-run were competing with spring-run Chinook salmon for spawning sites in the Sacramento River below Keswick Dam and speculated that the two runs may have hybridized. Feather River hatchery spring-run Chinook salmon have been documented as straying throughout Central Valley streams for many years (DFG 1998), and in many cases have been recovered from the spawning grounds of fall-run Chinook (Colleen Harvey-Arrison and Paul Ward, DFG, pers. comm., 2002), an indication that Feather River Hatchery spring-run Chinook salmon may exhibit fall-run life history characteristics. Although the degree of hybridization has not been comprehensively determined, it is clear that the populations of spring-run Chinook salmon spawning in the Feather River and counted at RBDD contain hybridized fish.

Accelerated predation may also be a factor in the decline of spring-run Chinook salmon. Although predation is a natural component of spring-run Chinook salmon life ecology, the rate of predation likely has greatly increased through the introduction of non-native predatory species such as striped bass and largemouth bass, and through the alteration of natural flow regimes and the development of structures that attract predators, including dams, bank revetment, bridges, diversions, piers, and wharfs (Stevens 1961, Vogel *et al.* 1988, Garcia, 1989, Decato 1978). The FWS found that more predatory fish were found at rock revetment bank protection sites between Chico Landing and Red Bluff than at sites with naturally eroding banks (Michny and Hampton 1984). On the mainstem Sacramento River, high rates of predation are known to occur at RBDD, ACID, GCID, and at south Delta water diversion structures (DFG 1998). From October 1976 to November 1993, DFG conducted ten mark/recapture experiments at the SWP's Clifton Court Forebay to estimate pre-screen losses using hatchery-reared juvenile Chinook salmon. Pre-screen losses ranged from 69 percent to 99 percent. Predation from striped bass is thought to be the primary cause of the loss (DFG 1998, Gingras 1997).

Spring-run Chinook salmon are harvested in ocean commercial, ocean recreational, and inland recreational fisheries. Coded wire tag returns indicate that Sacramento River salmon congregate off the coast between Point Arena and Morro Bay. Ocean fisheries have affected the age structure of spring-run Chinook salmon through targeting large fish for many years and reducing the number of four and five year olds (DFG 1998). An analysis of six tagged groups of Feather River Hatchery spring-run Chinook salmon by Cramer and Demko (1997) indicates that harvest rates of three-year-old fish ranged from 18 percent to 22 percent, four-year-olds ranged from 57 percent to 84 percent, and five-year-olds ranged from 97 percent-100 percent. Reducing the age structure of the species reduces it's resiliency to factors that may impact a year class. In-river recreational fisheries have historically taken fish throughout the species' range. During the summer, holding adult spring-run Chinook salmon are easily targeted by anglers when they congregate in large pools. Poaching also occurs at fish ladders, and other areas where adults congregate, however, the significance of poaching on the adult population is unknown.

Several actions have been taken to improve habitat conditions for spring-run Chinook salmon, including improved management of Central Valley water (e.g., through use of CALFED EWA and CVPIA (b)(2) water accounts) and new and improved screen designs at major water diversions along spring-run Chinook salmon tributaries and the mainstem Sacramento River, and changes in ocean and inland fishing regulations to minimize harvest. Although protective measures likely have led to recent increases in spring-run Chinook salmon abundance, the ESU is still below levels observed from the 1960s through 1990. Threats from hatchery production, climatic variation, predation, and water diversions persist. Because the spring-run Chinook salmon ESU is confined to relatively few remaining streams and continues to display broad fluctuations in abundance, the population is at a moderate risk of extinction.

C. Central Valley Steelhead

NOAA Fisheries listed the CV steelhead ESU as threatened on March 19, 1998 (63 FR 13347). The ESU includes all naturally-produced CV steelhead in the Sacramento-San Joaquin River Basin. NOAA Fisheries published a final 4(d) rule for steelhead on July 10, 2000 (65 FR 42422).

All steelhead stocks in the Central Valley are winter-run steelhead (McEwan and Jackson 1996). Steelhead are similar to Pacific salmon in their life history requirements. They are born in fresh water, emigrate to the ocean, and return to freshwater to spawn. Unlike other Pacific salmon, steelhead are capable of spawning more than once before they die.

The majority of the steelhead spawning migration occurs from October through February and spawning occurs from December to April in streams with cool, well oxygenated water that is available year round. Van Woert (1964) and Harvey (1995) observed that in Mill Creek, the steelhead migration is continuous, and although there are two peak periods, sixty percent of the run is passed by December 30. Similar bimodal run patterns have also been observed in the Feather River (Ryan Kurth, DWR, pers. comm., 2002), and the American River (John Hannon, Bureau of Reclamation, pers. comm., 2002).

Incubation time is dependent upon water temperature. Eggs incubate for one and a half to four months before emerging. Eggs held between 50° and 59° F hatch within three to four weeks (Moyle 1976). Fry emerge from redds within in about four to six weeks depending on redd depth, gravel size, siltation, and temperature (Shapovalov and Taft 1954). Newly emerged fry move to shallow stream margins to escape high water velocities and predation (Barnhart 1986). As fry grow larger they move into riffles and pools and establish feeding locations. Juveniles rear in freshwater for one to four years (Meehan and Bjornn 1991) emigrating episodically from natal springs during fall, winter and spring high flows (Colleen Harvey Arrison, DFG, pers. comm. 1999). Steelhead typically spend two years in fresh water. Adults spend one to four years at sea before returning to freshwater to spawn as four or five year olds (Moyle 1976).

Steelhead historically were well-distributed throughout the Sacramento and San Joaquin Rivers (Busby *et al*. 1996). Steelhead were found from the upper Sacramento and Pit River systems south to the Kings and possible the Kern River systems and in both east- and west-side Sacramento River tributaries (Yoshiyama *et al*. 1996). The present distribution has been greatly reduced (McEwan and Jackson 1996). The California Advisory Committee on Salmon and Steelhead (1988) reported a reduction of steelhead habitat from 6,000 miles historically to 300 miles. The California Fish and Wildlife Plan (DFG 1965) estimated there were 40,000 steelhead in the early 1950s. Hallock (1961) estimated an average of 20,540 adult steelhead through the 1960s in the Sacramento River, upstream of the Feather River.

Existing wild steelhead stocks in the Central Valley are mostly confined to upper Sacramento River and its tributaries, including Antelope, Deer, and Mill Creeks and the Yuba River. Populations may exist in Big Chico and Butte Creeks and a few wild steelhead are produced in the American and Feather Rivers (McEwan and Jackson 1996). Until recently, steelhead were thought to be extirpated from the San Joaquin River system. Recent monitoring has detected self sustaining populations of steelhead in the Stanislaus, Mokelumne, Calaveras, and other stream previously thought to be void of steelhead (McEwan 2001). It is possible that naturally spawning populations exist in many other streams but are undetected due to lack of monitoring programs (SPWT 1999).

Reliable estimates of steelhead abundance for different basins are not available (McEwan 2001), however, McEwan and Jackson (1996) estimate the total annual run size for the entire Sacramento-San Joaquin system, based on RBDD counts, to be no more than 10,000 adults. Steelhead counts at the RBDD have declined from an average of 11,187 for the period of 1967 to 1977, to an average of approximately 2,000 through the 1990s (McEwan and Jackson 1996, McEwan 2001).

The factors affecting the survival and recovery of CV steelhead are similar to those affecting winter- and spring-run Chinook salmon and are primarily associated with habitat loss (McEwan 2001). McEwan and Jackson (1996) attribute this habitat loss and other habitat problems primarily to water development resulting in inadequate flows, flow fluctuations, blockages, and entrainment into diversions. Other habitat problems related to land use practices and urbanization have also contributed to steelhead declines (Busby *et al*. 1996). Although many of the factors affecting salmon are common to steelhead, some stressors, especially summer water temperatures cause greater effects to steelhead because juvenile steelhead rear in freshwater for more than one year. Suitable steelhead conditions primarily occur in mid to high elevation streams. Because most suitable habitat has been lost to dam construction, juvenile rearing is generally confined to lower elevation stream reaches where water temperatures during late summer and early fall can be high.

Many of the habitat improvements that have benefitted winter- and spring-run Chinook salmon, including water management through the CVPIA (b)(2) water supply and the CALFED EWA, improved screening conditions at water diversions, and changes in inland fishing regulations (there is no ocean steelhead fishery) benefit CV steelhead. However, many dams and reservoirs in the Central Valley do not have water storage capacity or release mechanisms necessary to maintain suitable water temperatures for steelhead rearing through the critical summer and fall periods, especially during critically dry years (McEwan 2001). The future of CV steelhead is uncertain because of the lack of status and trend data.

IV. ENVIRONMENTAL BASELINE

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species within the action area. The environmental baseline "includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area (i.e., 600 meters upstream and 600 meters downstream of the Ord Ferry Bridge), the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process" (50 CFR § 402.02).

A. Status of the Listed Species and Critical Habitat within the Action Area

The action area, which is designated critical habitat for Sacramento River winter-run Chinook salmon, functions as a migratory corridor for adult Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon and CV steelhead, and provides juvenile rearing habitat for juveniles. Habitat within the action area is particularly important because it is used by a large number of listed anadromous fish during both upstream and downstream migrations.

Based on comparisons of juvenile salmonid outmigration timing at the GCID rotary screw trap, located 20 miles upstream of the action area, and the Knights Landing rotary screw trap, located approximately 90 miles downstream, winter-run Chinook salmon are expected to be within the action area between September and March, with the peak of the migration occurring from mid October to early November. Juvenile spring-run Chinook salmon are expected to be within the action area from November through May, with the peak coinciding with the first rain-related tributary and river flow increases between November and January. Juvenile steelhead outmigration will coincide with flow increases between November and June, with peak abundance occurring from January through March (DFG 2002, Snider and Titus 2000).

At the Knights Landing rotary screw trap, Snider and Titus (2000) observed that juvenile emigration occurred in three phases. Phase one was coincident with the first noticeable increase in Sacramento River flow; phase two was associated with a substantial increase in river flow; and phase three was associated with the large annual release of Coleman National Fish Hatchery fall-run Chinook. Similar patterns are expected to occur within the action area because the factors that affect river flow, such as the amount of tributary inflow, are essentially the same as at Knights Landing.

The migration timing of listed salmon and steelhead adults in the action area can be approximated by assessing studies that examine run timing in the Sacramento River (e.g., Hallock *et al.* 1957; Van Woert 1958; Vogel and Marine 1991). These studies show that adult winter-run Chinook salmon may be present in the action area from December through June, with the peak of the run passing between February and March. Adult spring-run Chinook salmon may be present in the action area from March through July with the peak expected to pass the action area between April and June. Adult steelhead may be present in the action area from September through June, with peaks in January and February, and again in May.

The relative abundance of winter-run Chinook salmon, spring-run Chinook salmon, and steelhead that migrate through the action area differs between species. The entire winter-run Chinook salmon population passes through the action area during adult upstream migration and juvenile outmigration. Approximately one-third of the spring-run Chinook salmon population passes through the action area, including the Mill, Deer, Antelope, Clear, and Big Chico creek sub-populations. The proportion of steelhead that migrate through the action are is unknown. However, because of the relatively large number of streams upstream of the action area that provide adequate summer rearing conditions for juvenile steelhead, it is probably high.

The Sacramento River, within the action area, is characterized as a valley floor reach with functioning alluvial processes, a low flow side channel, a mid-channel island, a dense corridor of riparian vegetation on the west river bank, and a narrow band of riparian vegetation on the east bank. With the exception of an adjacent vegetated slough to the northwest of the project area, aquatic habitat types include deep runs, riffles, and a small scour pool in the side channel. The primary deep water adult salmonid holding habitat is located at the upstream and downstream margins of the action area. Riparian vegetation adjacent to the river, including shaded riverine aquatic (SRA) habitat, is an important habitat component for winter- and spring-run Chinook salmon, and steelhead because it provides cover, shelter, shade, and contributes to food production (Platts 1991). Side channels, dense riparian habitat, and functioning lateral channel migration processes, create diverse and extensive juvenile rearing conditions and refugia habitat throughout the action area.

Sacramento River flows through the action area primarily are influenced by regulated releases from Shasta Reservoir, although several large tributaries, including Battle, Cottonwood, Stony, Mill, and Deer creeks contribute measurable flows during the winter. River flows typically peak during winter storms and are lowest following the irrigation season in late fall and early winter (DWR 1998). From July, 2001 to July, 2002, the lowest flow recorded at the Ord Ferry gauging station was 4,209 cfs in November, and the highest flow was 86,747 in January 2002.

There is no salmonid spawning habitat within the action area. Winter-run Chinook salmon spawning habitat is located nearly one hundred miles upstream, and spring-run Chinook salmon and steelhead spawning tributaries are located approximately fifty miles upstream of the action area. Because of the upstream location of spawning habitat and the lack of deep holding pools within the action area, adult salmonid residence time in the action area is probably brief.

B. Factors Affecting Species and Critical Habitat within the Action Area

The factors affecting the species and critical habitat within the action area include river flow, water temperature, riparian habitat conditions, and geomorphological processes. Two variables appear to trigger downstream migration of juvenile salmonids through the action area: increases in river flow, and the mass migration of Coleman National Fish Hatchery fall-run Chinook (Snider and Titus 2000). Water temperatures may also influence migration patterns. Although irrigation releases from Shasta Dam increase Sacramento River flows throughout the summer, water temperatures are warm in the action area, and juveniles outmigrate with flow increases that correspond with cooling air and water temperatures in the fall.

Riparian conditions affect juveniles by providing overhead shaded cover, in channel large woody cover, and contributing to aquatic food production. Adult salmonids also benefit from the refugia created by overhead and in-channel cover, especially in areas that correspond with deep water.

The hydrologic and geologic processes in the action area have created habitat complexity by creating a secondary channel, a mid-channel island, and an oxbow that is partially connected to the Sacramento River. The vegetated back water habitats and shallow, gravelly margins created by these processes contribute to extensive juvenile rearing habitat and provide juveniles refuge from deep water predators.

C. Likelihood of Species Survival and Recovery in the Action Area

Although the action area is small relative to all of the migration and rearing habitat available to the species, the quality and complexity of riparian and in-water habitat make it an important node of habitat in the Sacramento River for the survival and recovery of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon and CV steelhead. One factor that contributes to the importance of this habitat to winter- and spring-run Chinook salmon is that all of the winter-run Chinook salmon population and possibly up to half of the spring-run Chinook salmon population must pass through the action area during their upstream and downstream migrations. Considering the quality of habitat conditions within the action area, it appears that winter- and spring-run Chinook salmon and steelhead will continue to utilize the action area as a migratory corridor, and for juvenile rearing, as long as existing habitat components and processes remain intact.

V. EFFECTS OF THE ACTION

Pursuant to Section 7(a)(2) of the ESA (16 U.S.C. §1536), Federal agencies are directed to ensure that their activities are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. This biological opinion assesses the effects of Ord Ferry Road Bridge Seismic Retrofit Project on endangered Sacramento River winter-run Chinook salmon, threatened CV spring-run Chinook salmon, threatened CV steelhead, and the designated critical habitat of Sacramento River winter-run Chinook salmon. The Bridge Retrofit Project is likely to adversely affect listed species and critical habitat through changes in water quality and loss of SRA habitat from construction activities, pile driving, cofferdam installation, and emergency fish salvage. The project includes integrated design features to avoid and minimize many potential impacts. In the *Description of the Proposed Action* section of this biological opinion, NOAA Fisheries provided an overview of the action. In the *Status of the Species* and *Environmental Baseline* sections of this biological opinion, NOAA Fisheries provided an overview of the threatened and endangered species and critical habitat that are likely to be adversely affected by the activity under consultation.

Regulations that implement section 7(b)(2) of the ESA require biological opinions to evaluate the direct and indirect effects of Federal actions and actions that are interrelated with or interdependent to the Federal action to determine if it would be reasonable to expect them to appreciably reduce listed species' likelihood of surviving and recovering in the wild by reducing their reproduction, numbers, or distribution (16 U.S.C. §1536; 50 CFR 402.02). Section 7 of the ESA and its implementing regulations also require biological opinions to determine if Federal actions would destroy of adversely modify the conservation value of critical habitat (16 U.S.C. §1536).

NOAA Fisheries generally approaches "jeopardy" analyses in a series of steps. First, we evaluate the available evidence to identify the direct and indirect physical, chemical, and biotic effects of proposed actions on individual members of listed species or aspects of the species' environment (these effects include direct, physical harm or injury to individual members of a species; modifications to something in the species' environment - such as reducing a species' prey base, enhancing populations of predators, altering its spawning substrate, altering its ambient temperature regimes; or adding something novel to a species' environment - such as introducing exotic competitors or a sound). Once we have identified the effects of an action, we evaluate the available evidence to identify a species' probable response (including behavioral responses) to those effects to determine if those effects could reasonably be expected to reduce a species' reproduction, numbers, or distribution (for example, by changing birth, death, immigration, or emigration rates; increasing the age at which individuals reach sexual maturity; decreasing the age at which individuals stop reproducing; among others). We then use the evidence available to determine if these reductions, if there are any, could reasonably be expected to appreciably reduce a species' likelihood of surviving and recovering in the wild.

To evaluate the effects of the Bridge Retrofit Project, NOAA Fisheries examined proposed construction activities and conservation measures, and identified likely impacts to listed anadromous salmonids within the action area based on the best available information.

A. In-water Construction Window

The in-water work window of May 15 through October 15 is designed to allow a reasonable construction period while avoiding or minimizing impacts to peak migrations of listed anadromous fish. Because of the abundance of adult and juvenile run timing data collected at upstream, downstream, and tributary monitoring sites, it is possible to estimate the relative proportion of each run that will be affected by in-water work activities. This run timing information indicates that the proposed work window will overlap with portions of both adult and juvenile populations of winter-run Chinook salmon, spring-run Chinook salmon, and steelhead.

The initial portions of the juvenile winter-run Chinook salmon migration that pass through the action area in September and early October will be exposed to the effects of in-water work, but the peak of the migration is not expected until after in-water work is complete. With the peak migration of juvenile spring-run Chinook salmon and juvenile steelhead occurring from November through January and from

January through March, respectively, only the latter portions of these runs will be affected by in-water work conducted in May and early June.

An overlap between the in-water work window and adult run timing also exists. The latter portion of the winter-run Chinook salmon run in late May and June and peak of the spring-run Chinook salmon run in late May will overlap with the proposed in-water work period. The early portion of the steelhead run in September and early October and the latter portion of the run in late May and early June will overlap with in-water work, but the two peaks of the run in fall and winter will not be affected.

B. Water Quality

In-river construction and demolition work (e.g., pile driving and removal) are expected to increase suspended sediment and elevate turbidity in the Sacramento River above natural levels. Turbidity increases will be limited to 10 to 20 percent above natural levels. Other activities that may introduce sediment to the river and increase turbidity include the use of access roads and near-river staging areas by construction equipment. NOAA Fisheries expects that adherence to the SPP will sufficiently minimize the risk of introducing petroleum products or pollutants other than sediment to the waterway because the prevention and contingency measures will require frequent equipment checks to prevent leaks, will keep stockpiled materials away from the water, and will require that absorbent booms are kept onsite to prevent petroleum products from entering the river in the event of a spill or leak.

Research has shown that suspended sediment and turbidity levels moderately elevated above natural background values can result in non-lethal detrimental effects to salmonids. Suspended sediment affects salmonids by decreasing reproductive success, reducing feeding success and growth, causing avoidance of rearing habitats, and disrupting migration cues (Bash *et al.* 2001). Sigler *et al.* (1984) in Bjornn and Reiser (1991), found that turbidities between 25 and 50 NTUs reduced growth of juvenile coho salmon and steelhead. Macdonald *et al.* (1991) found that the ability of salmon to find and capture food is impaired at turbidities from 25 to 70 NTUs. Bisson and Bilby (1982) reported that juvenile coho salmon avoid turbidities exceeding 70 NTUs. Increased sediment delivery can also fill interstitial substrate spaces and reduce cover for juvenile fish (Platts and Megahan 1975) and abundance and availability of aquatic invertebrates for food (Bjornn and Reiser 1991). Turbidity should affect Chinook salmon and steelhead in much the same way that it affects other salmonids, because of similar physiological and life history requirements between species.

Newcombe and Jensen (1996) believe that impacts on fish populations exposed to episodes of high suspended sediment may vary depending on the circumstance of the event. They also believe that wild fish may be less susceptible to direct and indirect effects of localized suspended sediment and turbidity increases because they are free to move elsewhere in the system and avoid sediment related effects. They emphasize that the severity of effects on salmonids depends not only on sediment concentration, but also on duration of exposure and the sensitivity of the affected life stage.

Suspended sediment from construction activities would increase turbidity at the project site and could continue downstream. While some suspended sediment may derive from erosion along access routes and other disturbed ground, the majority is expected from in-water work activities such as steel pile and cofferdam installation and removal. The nature of the activities would confine sediment and turbidity increases to the location of the disturbance activity and downstream for several hundred feet. Because of the localized nature of sediment and turbidity changes, only portions of the action area are expected to be impacted by any increase, while the remainder of the action area will be unaffected (i.e., sediment generated during coffer dam removal along the right bank of the Sacramento River is not expected to increase turbidity along the left bank), thus limiting exposure to the fish that are in the pathway of the turbidity event and not affecting fish or the suitability of habitat that are not within the turbidity plume. Although Chinook salmon and steelhead are highly migratory and capable of moving freely throughout the action area, a sudden localized increase in turbidity may injure some juvenile salmonids by temporarily disrupting normal behaviors that are essential to growth and survival such as feeding, sheltering, and migrating. Injury is caused when disrupting these behaviors increases the likelihood that individual fish will face increased competition for food and space, and experience reduced growth rates or possibly weight loss. Project-related turbidity increases may also affect the sheltering abilities of some juvenile salmon and steelhead and may decrease their likelihood of survival by increasing their to the susceptibility to predation.

Despite the use of the May through October 15 work window, some migrating juvenile and adult winter- and spring-run Chinook salmon, and steelhead may potentially be present within the action area during construction and injured by a project-related sediment increase. Fish migrating during the in-water work window may face localized exposure to increased suspended sediment and turbidity during the installation and removal of steel piles and cofferdams at two bridge columns per year for three consecutive years. There will not be any effects to redds, eggs, or newly emerged fry because the action area does not contain any spawning or early rearing habitat.

Adherence to the preventative and contingency measures of the SWPPP, including proposed BMPs such as use of silt fences, straw bales and straw wattles, and cease and desist orders will minimize the amount of project-related sediment to a level that meets the Regional Board turbidity objectives included in the project description. Regional objectives may not fully alleviate risks to salmonids because although they limit the concentration of suspended sediments relative to background levels, they do not explicitly consider the duration of exposure or the particular life stage of the affected species.

However, because of the localized nature of project-related suspended sediment and turbidity increases, the availability of habitat within the action area that will remain unimpaired when sediment plumes occur, the highly migratory behavior of anadromous fish within the action area, and the avoidance of peak migration periods through the implementation of in-water construction windows, the injury and death that will occur to salmon and steelhead from changes in feeding behavior, distribution and predation, are not expected to result in changes to listed anadromous populations.

C. Shaded Riverine Aquatic Habitat

Approximately one-half acre of riparian vegetation will be removed to improve access to the construction site. Construction related impacts to riparian vegetation and SRA habitat will be minimized by limiting riparian vegetation removal to construction access sites and by replacing lost vegetation onsite at a 6:1 ratio.

The reduction of riparian habitat represents approximately one percent of the total amount of riparian habitat within the action area. The effect of this loss will be a reduction in the quality of habitat, including designated critical habitat for winter-run Chinook salmon, until vegetation is fully re-established. Willows should vegetate the site within five years, but larger components of riparian vegetation could require between five and ten years to revegetate. Most of the existing habitat features should be replaced in ten years. Despite the small amount of riparian vegetation that will be impacted relative to the action area, the food production and shelter provided by this habitat will be lost for up to ten years and could injure juveniles by reducing the growth rates of juveniles that utilize this habitat or expend energy to relocate and find other feeding and shelter habitats. However, the amount of injury should be small, because of the low percentage of the action area that will be impacted.

D. Pile Driving

Steel piles will be driven into the riverbed to retrofit six bridge columns and to support the temporary trestle. Steel piles for the column retrofit will be driven at the time each column us being retrofitted, and placed on an as needed basis to reach two in-water columns per constructed season for a period of three construction seasons.

Pile driving consists of driving steel pile columns and sheets into the riverbed with a mechanical hammer. The force of the hammer hitting a pile forms a sound wave that travels down the pile and causes the pile to resonate radially and longitudinally. Acoustic energy is formed as the walls of the steel pile expand and contract, forming a compression wave that moves through the pile. The outward movement of the pipe pile wall sends a pressure wave propagating outward from the pile and through the riverbed and water column in all directions.

The effect pile driving has on fish depends upon the pressure, measured in decibels (dB), of a sound or compression wave. Rassmusen (1967) found that immediate mortality of juvenile salmonids may occur at sound pressure levels exceeding 204 dB. Sustained sound pressures (four hours) in excess of 180 dB damaged the hair cells in the inner ear of cichlids (Hastings *et al.* 1996).

Feist *et al.* (1992) found that abundance of juvenile salmon near pile driving rigs in Puget Sound was two-fold greater on non-pile driving days as on pile-driving days, indicating that juveniles were startled by the activity and that pile driving caused a temporary avoidance of habitat at the project site. Although the pile-driving created sound that could be detected at least 600 m away from the source at a level within the range of salmonid hearing, salmon at this range did not always exhibit a reaction to the sound (Feist *et al*. 1992). McKinley and Patrick (1986) found that salmon smolts exposed to pulsed sound (similar to pile driving) demonstrated a startle or avoidance response, and Anderson (1990) observed a startle response in salmon smolts at the beginning of a pile driving episode but found that after a few poundings fish were no longer startled.

At the City of Sacramento Water Treatment Plant Fish Screen Project, engineering analysis anticipated that the use of a smaller pile driving hammer that is similar in size to the class of hammer expected to be used at the Bridge Retrofit Project, would generate sound pressure levels of 95 to 120 dB. Because of the similarities in river depth, substrate sizes, and size of the pile driver at the City of Sacramento Water Treatment Plant Fish Screen Project and the Bridge Retrofit Project, anticipated sound levels should be below the 200 dB threshold known to cause internal tissue damage to fish. However, the levels may be high enough to affect adult and juvenile salmonids by startling fish and causing avoidance of habitats within 600 m of the noise source.

The startling of juvenile salmonids causes injury by temporarily disrupting normal behaviors that are essential to growth and survival such as feeding, sheltering, and migrating. Injury is caused when disrupting these behaviors increases the likelihood that individual fish will face increased competition for food and space, and experience reduced growth rates or possibly weight loss. Disruption of these behaviors may also result in the death of some individuals to increased predation if fish are disoriented or concentrated in areas with high predator densities. Disruption of these behaviors will occur between May 15 and October 15 of each construction year, during daylight operation hours of the hydraulic hammer. Downstream movement of fry occurs mainly at night, although small numbers of Chinook salmon fry move during daylight hours (Reimers 1971). Because of this nocturnal migratory behavior, daily migration delays are expected only to impact the portion of each ESU that migrates during daylight hours. On similar bridge projects, such as the replacement of the I-5 bridge over the Sacramento River near Anderson, lapses in pile driving activity are common throughout the day because construction crews suspend hammer work for equipment maintenance, to shift from one pile to another, and to take breaks (D. Whitley, Caltrans, pers. comm., 2002). These construction lapses, including daily breaks and nighttime non-working periods will allow fish to migrate through the action area and minimize the extent of injury that occurs to populations.

Adult spring-run Chinook salmon that are migrating upstream in May and June may be startled by pile driving and may experience daily migration delays of up to eight hours by holding downstream of the bridge until the pile driving stops. These migration delays are not expected to injure adults because adult fish commonly hold in deep pools while migrating upstream, and because they do not begin spawning until September, at least three months after any migration delay might occur.

NOAA Fisheries anticipates that pile driving will be detectable to salmonids up to 600 meters from the source, and that the sounds generated will harass juvenile salmon and steelhead by causing injury from temporary disruption of normal behaviors such as feeding, sheltering, and migrating that may contribute to reduced or negative growth. Disruption of these behaviors may also lead to increased predation if fish become disoriented or concentrated in areas with high predator densities. These effects should be small because pile driving will occur during the day, enabling unhindered fish passage at night during peak migration times. The May 15 through October 15 work window will further minimize the extent of the impacts on listed anadromous fish by avoiding the peaks of adult and juvenile migration periods.

E. Cofferdams and Bridge Columns

Two cofferdams will be constructed each year for three years. Cofferdams will be constructed around existing bridge columns and retrofit construction will occur once the cofferdam is closed and dewatered. The cofferdam installation process, using sheet pile driving, will probably startle juvenile salmonids and cause harassment that is similar to pile driving. It is also possible that some fish will be entrained when the coffer is closed. Closure of cofferdams after August 1 may entrap juvenile winter- and spring-run Chinook salmon, and steelhead. Fish salvage will be conducted in accordance with a fish salvage plan approved by NOAA Fisheries. The fish salvage will occur following the closure of each cofferdam and is expected to reduce the mortality associated with draining the enclosed area. Any juvenile fish recovered from a cofferdam would be relocated downstream, and any adult salmonids would be relocated upstream of the bridge. A mortality rate of less than 10 percent (as indicated by other fish salvage efforts) is expected from capturing and handling. Juvenile fish may also be injured during the salvage efforts through scale loss, and fin damage.

The footprint of the retrofitted bridge columns will be approximately three feet wider than the existing columns resulting in an a small, permanent loss of riverine habitat. This loss is expected to total 0.36 acres of riverbed. Because the amount of habitat loss, including loss of designated critical habitat for winter-run Chinook salmon, will be small relative to the action area, and there is extensive juvenile rearing habitat throughout the action area that is higher in quality than the habitat found near the bridge columns, the loss of habitat is not expected to cause a reduction in the number of juvenile fish that migrate and rear within the action area. Additionally, to minimize the permanent loss of 0.36 acres riverine habitat Caltrans will purchase a 2.16 acre parcel of riverside land with stipulations that the parcel never be protected with revetment so that natural riverine processes, including recruitment of LWD will occur. There will be no permanent impacts to adult salmonid passage because the change in the footprint area at the existing column locations will not alter the deepwater adult holding habitats located upstream and downstream of the Ord Ferry Bridge.

VI. CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Ongoing agricultural activities likely will continue to affect stormwater runoff patterns and water quality in the action area, and thus result in cumulative effects to listed chinook salmon and steelhead. It is possible that agriculture could expand further onto the floodplain of the river corridor. However, due to the existing function of fluvial processes along this reach of the Sacramento River, this type of expansion may be unlikely to occur. Extensive urban development is not expected to occur in the near future in the action area.

VII. INTEGRATION AND SYNTHESIS OF EFFECTS

A. Impacts of the Proposed Action on Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Chinook Salmon, and Central Valley Steelhead, and Designated Critical Habitat

NOAA Fisheries finds that the effects of the proposed action on Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and CV steelhead, and the designated critical habitat of Sacramento River winter-run Chinook salmon will include a temporary increase in suspended sediment and turbidity, a short-term reduction of SRA habitat, harassment, injury, and possible predation-related mortality of individuals from pile driving, and harassment, injury and potential mortality of individuals entrained or salvaged from behind cofferdams. With the exception of loss of SRA habitat, the May 15 to October 15 instream work window will minimize project-related effects by avoiding the peak migration periods of adult and juvenile salmonid migrations.

The most likely effects to listed salmonids resulting from the proposed action are harassment of juvenile winter- and spring-run Chinook salmon, and steelhead resulting from the noise of pile driving, and entrainment of juveniles into cofferdams. Pile driving is expected to result in temporary disruptions in the feeding, sheltering, and migratory behavior of adult juvenile salmon and steelhead. This disruption may injure or kill juveniles by causing reduced growth and increased susceptibility to predation. Adults should not be injured because the disruptions should only include temporary migration delays that should not prevent successful spawning. Pile driving is also not expected to prevent salmonids from passing upstream or downstream because pile driving will not be continuous through the day, and will not occur at night, when the majority of fish migrate. Pile driving effects will be minimized by avoiding the peak migration periods of listed anadromous salmonids. Death as a result of entrainment is expected to be minimized by salvaging and relocating fish away from the project site. A low mortality rate of juveniles (<10 percent) is expected to result from fish salvage.

Turbidity changes that are within the Regional Board standards may result in sudden localized turbidity increases that could injure juvenile salmonids by temporarily impairing their migration, rearing, feeding, or sheltering behavior. Project-related turbidity increases may also contribute to the susceptibility of juvenile salmonids to increased predation. Turbidity related injury and predation will be minimized by implementing the avoidance and contingency measures of the SWPPP, and by scheduling in-water work to avoid peak migration periods of listed anadromous salmonids.

The temporary loss of less than one-half acre of riparian vegetation will result in a small reduction of nearshore cover and food production until the vegetation in the disturbed areas is re-established (five to ten years). Revegetating the project area at a 6:1 ratio will minimize the effect of this habitat loss. Because of the diverse habitat conditions in the action area, and other forms of cover and food production available to salmon and steelhead within the action area, the loss of less than one-half acre of vegetation is not expected to significantly impair the essential behavioral patterns of listed anadromous fish and will, therefore, not result in a reduction in numbers. There will be a permanent loss of 0.36 riverine habitat from the increased size of the bridge columns. To compensate for the loss of critical habitat, Caltrans will purchase a 2.16 acre parcel of riverside land with stipulations that the parcel never be protected with revetment so that natural riverine processes, including recruitment of LWD will occur.

B. Impacts of the Proposed Action on ESU Survival and Recovery

The adverse effects to winter- and spring-run Chinook salmon, and steelhead within the action area are not expected to affect the overall survival and recovery of the ESUs. This is largely due to the fact that although construction may cause adverse effects to some listed salmonids, the impacts will avoid the largest proportions of listed anadromous fish that migrate through the action area by limiting in-water work to months that do not coincide with peak migration periods. Additionally, most of the effects are not lethal. Construction-related harassment will be temporary and will not impede adult fish from reaching upstream spawning and holding habitat, or juvenile fish from migrating downstream. The project will compensate for temporary and permanent losses of critical habitat by planting riparian vegetation at the project site and at a nearby riverside mitigation site at a 6:1 ratio, which includes the 2.16 acres that will not be protected with revetment and allowed to develop with natural riverine processes.

VIII. CONCLUSION

After reviewing the best available scientific and commercial information, the current status of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, the designated critical habitat of Sacramento River winter-run Chinook salmon, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NOAA Fisheries' biological opinion that the Ord Ferry Bridge Retrofit Project, as proposed, is not likely to jeopardize the continued existence of the Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, CV steelhead, and is not likely to destroy or adversely modify the designated critical habitat Sacramento River winter-run Chinook salmon.

IX. INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NOAA Fisheries as an act which kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the FHWA and Caltrans so that they become binding conditions of any grant or permit, as appropriate, for the exemption in section 7(o)(2) to apply. The FHWA has a continuing duty to regulate the activity covered by this incidental take statement. If the FHWA (1) fails to assume and implement the terms and conditions or (2) fails to require the FHWA to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Caltrans must report the progress of the action and its impact on the species to NOAA Fisheries as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

A. Amount or Extent of Take

NOAA Fisheries anticipates that the proposed action will result in incidental take of Sacramento River winter-run Chinook salmon, CV spring-run Chinook salmon, and CV steelhead. Incidental take associated with this action is expected to be in the form of harassment of winter- and spring-run Chinook salmon and steelhead juveniles resulting from pile driving, cofferdam installation, fish salvage, and temporary loss of SRA habitat. Some mortality (<10 percent of all fish collected) is anticipated from conducting fish salvage within cofferdams.

NOAA Fisheries cannot, using the best available information, quantify the anticipated incidental take of individual winter- and spring-run Chinook salmon and steelhead because of the variability and uncertainty associated with the population size of each species, annual variations in the timing of migration, and uncertainties regarding individual habitat use of the project area. However, it is possible to describe the conditions that will lead to the take. Specifically, take during the three-year project is not expected to exceed that associated with the construction between May 15 and October 15, of two cofferdams per year for three years; three years of pile driving at or below 120 dB in a 600 m radius from the pile driving source; two coffer dam fish salvage activities per year that will kill up to ten percent of all fish captured; increased sediment and turbidity from the installation and removal of steel piles and cofferdams at two bridge columns per year. Loss of riparian vegetation for construction access is not expected to exceed 0.5 acres for 10 years. A permanent loss of 0.36 acres of riverbed is expected as a result of the larger size of the six retrofitted bridge columns.

Anticipated incidental take may be exceeded if project activities exceed the criteria described above, if the project is not implemented as described in the BA for the Ord Ferry Bridge Seismic Retrofit (Caltrans 2002), if the proposed conservation measures listed in the *Description of the Proposed Action* section are not implemented, or if the project is not implemented in compliance with the terms and conditions of this incidental take statement.

B. Effect of Take

In the accompanying biological opinion, NOAA Fisheries determined that this level of anticipated take is not likely to result in jeopardy to the species considered in this opinion, or destruction or adverse modification of critical habitat.

C. Reasonable and Prudent Measures

Pursuant to section 7(b)(4) of the ESA, the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize take of listed winter-run Chinook salmon, spring-run Chinook salmon and steelhead and to avoid adverse modification of designated critical habitat.

1. Measures shall be taken to minimize incidental take of listed anadromous fish by restricting and isolating in-water work to avoid vulnerable life stages.

2. Measures shall be taken to minimize incidental take of listed anadromous fish from during the closure of coffer dams.

3. Measure shall be taken to validate that erosion, sediment, and turbidity controls and contingency measures are effective.

4. Measures shall be taken to minimize the effects of temporary habitat loss of riverine and riparian habitat.

5. Measures shall be taken to maintain fish passage for salmonids through the project site.

6. FHWA/Caltrans shall provide a report of project activities to NOAA Fisheries by December 31 of each construction year.

7. Caltrans shall report any incidence of take to NOAA Fisheries.

D. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the FHWA and Caltrans must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

NOAA Fisheries believes that take is not expected to exceed that associated with the cofferdam construction, pile driving, and fish salvage activities resulting from replacing two in-water bridge columns and footings per year, between May 15 and October 15 for a period of three years. Loss of riparian vegetation for construction access is not expected to exceed 0.5 acres for 10 years. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal action agency must immediately provide an explanation of the causes of the taking and review with NOAA Fisheries the need for possible modification of the reasonable and prudent measures.

1. Measures shall be taken to minimize incidental take of listed anadromous fish by restricting and isolating in-water work to avoid vulnerable life stages.

    a. Cofferdams shall be installed prior to September 1 of each construction year. Cofferdam removal can take place at any time between May 15 and October 15.

2. Measures shall be taken to minimize incidental take of listed anadromous fish from during the closure of coffer dams.

    a. Any fish salvage efforts should be conducted by fishery biologists or technicians with at least two years experience handling Federally listed anadromous fish. The proposed fish salvage plan shall be submitted to NOAA Fisheries for approval prior to beginning bridge construction.

3. Measure shall be taken to validate that erosion, sediment, and turbidity control measures are effective.

    a. FHWA/Caltrans shall check and maintain sediment control and retention structures to ensure they are effective throughout the rainy season.

4. Measures shall be taken to minimize temporary and permanent loss of riparian and riverine habitat.

    a. FHWA and Caltrans shall develop a revegetation plan for the project that compensates for the removal of riparian vegetation at the proposed areal ratio of 6:1. This plan shall include a maintenance schedule for assuring full replacement of the amount lost during construction.

    b. FHWA and Caltrans shall replace, into the active Sacramento River channel, any large wood debris (i.e., trunk or branch diameter >6 inches in diameter) that is removed during construction.

5. Measures shall be taken to maintain fish passage for salmonids through the project site.

    a. FHWA/Caltrans shall establish non-work periods of at least eight hours at night to allow quiet migration conditions for anadromous fish.

    b. FHWA/Caltrans shall remain informed of the pile driving acoustic monitoring at the State Route 299 Bridge Replacement Project. If monitoring for that project indicates that underwater sound levels exceed 120 dB, Caltrans shall develop an acoustic monitoring plan to determine the actual noise levels generated during the Ord Ferry Bridge Project.

6. FHWA/Caltrans shall provide an annual report of project activities to NOAA Fisheries by December 31 of each construction year.

    g. This report shall include a summary description of in-water construction activities, avoidance and/or minimization measures taken, and any observed take incidents.

7. Caltrans shall report any incidence of take to NOAA Fisheries.

    a. If a listed species is observed injured or killed by project activities, FHWA/Caltrans shall contact NOAA Fisheries within 48 hours by FAX. Notification shall include species identification, the number of fish injured or killed, and a description of the action that resulted in take. A dated copy of this information also shall be attached to the annual report. If possible, dead individuals shall be collected, placed in an airtight bag, and refrigerated with the aforementioned information unless directed to do otherwise by NOAA Fisheries.

Reports and notifications required by these terms and conditions shall be submitted to:

Sacramento Area Office
National Marine Fisheries Service
650 Capitol Mall, Suite 8-300
Sacramento CA 95814-4706
FAX: (916) 930-3629
Phone: (916) 930-3600

X. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. These conservation recommendations include discretionary measures that the FHWA and Caltrans can implement to avoid or minimize adverse effects of a proposed action on a listed species or critical habitat or regarding the development of information. NOAA Fisheries provides the following conservation recommendations that would avoid or reduce adverse impacts to listed salmonids:

1. FHWA/Caltrans should conduct acoustic studies to evaluate the effects of pile driving on salmonids in order to develop site specific avoidance and minimization measures for future bridge projects.
2. FHWA/Caltrans should develop plans that minimize alteration or disturbance of the Sacramento River bank and existing riparian vegetation.
3. FHWA/Caltrans should promote and encourage the use of bridge and road designs that prevent untreated stormwater from entering stream channels.
4. FHWA/Caltrans should promote and encourage the use of bridge and road designs that minimize riparian and stream habitat encroachment, disruption, or fragmentation.

In order for NOAA Fisheries to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, NOAA Fisheries requests notification of the implementation of any conservation recommendations.

XI. REINITIATION OF CONSULTATION

This concludes formal consultation on the proposed Ord Ferry Road Bridge Retrofit Project. Reinitiation of formal consultation is required if (1) the amount or extent of taking specified in any incidental take statement is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the action, including the avoidance, minimization and compensation measures listed in the *Description of the Proposed Action* section is subsequently modified in a manner that causes an effect to the listed species that was not considered in the biological opinion; or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, formal consultation shall be reinitiated immediately.

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Enclosure 2

MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS

Federal Highway Administration's Ord Ferry Road Bridge Seismic Retrofit Project

I. IDENTIFICATION OF ESSENTIAL FISH HABITAT

This document represents the National Marine Fisheries Service's (NOAA Fisheries) Essential Fish Habitat (EFH) consultation based on our review of information provided by the Federal Highway Administration (FHWA) and the California Department of Transportation (Caltrans) on the Ord Ferry Road Bridge Seismic Retrofit Project (Bridge Retrofit Project). The Magnuson-Stevens Fishery Conservation Act (MSA) as amended (U.S.C 180 *et seq.*) requires that EFH be identified and described in Federal fishery management plans (FMPs). Federal action agencies must consult with NOAA Fisheries on activities which they fund, permit, or carry out that may adversely affect EFH. NOAA Fisheries is required to provide EFH conservation and enhancement recommendations to the Federal action agencies. The geographic extent of freshwater EFH for Pacific salmon in the Sacramento River includes waters currently or historically accessible to salmon within hydrologic units 18020109 (lower Sacramento River) and 18020112 (upper Sacramento River to Clear Creek).

EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of essential fish habitat, "waters" includes aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means habitat required to support a sustainable fishery and a healthy ecosystem; and “spawning, breeding, feeding, or growth to maturity” covers all habitat types used by a species throughout its life cycle.

The biological opinion for the Bridge Retrofit Project addresses Chinook salmon listed under the both the Endangered Species Act (ESA) and the MSA that potentially will be affected by the proposed action. These salmon include Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), and Central Valley spring-run Chinook salmon (*O. tshawytscha)*. This EFH consultation will concentrate on Central Valley fall-/late fall-run Chinook salmon (*O. tshawytscha*) because they are covered under the MSA but not listed under the ESA.

Historically, Central Valley fall-run Chinook salmon generally spawned in the Central Valley and lower-foothill reaches up to an elevation of approximately 1,000 feet. Much of the historical fall-run spawning habitat was located below existing dam sites and the run therefore was not as severely affected by water projects as other runs in the Central Valley.

Although fall-run Chinook salmon abundance is relatively high, several factors continue to affect habitat conditions in the Sacramento River, including loss of fish to unscreened agricultural diversions, predation by warm-water fish species, lack of rearing habitat, regulated river flows, high water temperatures, and reversed flows in the Delta that draw juveniles into State and Federal water project pumps.

A. Life History and Habitat Requirements

Central Valley fall-run Chinook salmon enter the Sacramento River from July through December, and late fall-run enter between October and March. Fall-run Chinook salmon generally spawn from October through December, and late fall-run fish spawn from January to April. The physical characteristics of Chinook salmon spawning beds vary considerably. Chinook salmon will spawn in water that ranges from a few centimeters to several meters deep provided that the there is suitable sub-gravel flow (Healey 1991). Spawning typically occurs in gravel beds that are located in marginally swift riffles, runs and pool tails with water depths exceeding one foot and velocities ranging from one to 3.5 feet per second. Preferred spawning substrate is clean loose gravel ranging from one to four inches in diameter with less that 5 percent fines (Reiser and Bjornn 1979).

Fall-run Chinook salmon eggs incubate between October and March, and juvenile rearing and smolt emigration occur from January through June (Reynolds *et al*. 1993). Shortly after emergence, most fry disperse downstream towards the Sacramento-San Joaquin Delta and estuary while finding refuge in shallow waters with bank cover formed by tree roots, logs, and submerged or overhead vegetation (Kjelson *et al*. 1982). These juveniles feed and grow from January through mid-May, and emigrate to the Delta and estuary from mid-March through mid-June (Lister and Genoe 1970). As they grow, the juveniles associate with coarser substrates along the stream margin or farther from shore (Healey 1991). Smolts generally spend a very short time in the Delta and estuary before entry into the ocean.

II. PROPOSED ACTION.

FHWA, in cooperation with Caltrans and Butte County, proposes to seismically retrofit the Ord Ferry Bridge over the Sacramento River at river mile 184. The Ord Ferry Bridge is located approximately seven miles south of Hamilton City on Ord Ferry Road, in Butte County. The purpose of the Bridge Retrofit Project is to improve user safety. Construction is proposed to last three seasons with in-water work limited to the period from May 15 through October 15. The proposed action is described in the Section II (*Description of the Proposed Action*) of the preceding biological opinion.

III. EFFECTS OF THE PROJECT ACTION

The effects of the proposed action on Sacramento River winter-run Chinook salmon and Central Valley spring-run Chinook salmon are described in Sections V (*Effects of the Action*) and VII (*Integration and Synthesis of Effects*) of the preceding biological opinion. The effects of the proposed action on Central Valley fall-/late fall-run Chinook salmon are discussed below.

The upper mainstem Sacramento river provides important spawning and rearing habitat for fall-run Chinook salmon. The proposed action may affect fall-run Chinook salmon habitat through changes in water quality from construction activities, and temporary loss of riparian vegetation. All of these effects will be temporary but most are expected to last for the duration of the project. Changes in water quality will be avoided or through meeting Regional Water Quality Control Board (Regional Board) objectives, Caltrans water pollution specifications, implementing applicable Best Management Practices (BMPs), staging equipment outside of the riparian corridor, and limiting in-water work to May 15 through October 15 of each construction year. These measures will involve using silt fences, straw mulch, erosion control seeding, and clean, washed work pad substrates to minimize the amount of project-related sediment introduced to the action area; removing drilling and excavation materials to locations outside of the river channel, and halting work in the event of a plume detection to minimize project related sediment plumes caused by in-river construction; and will minimize the risk of leaks and spills from equipment, and enable timely responses to spills if they occur.

Removal of riparian habitat will affect fall-run Chinook salmon by temporarily reducing the amount of overhanging and submerged vegetation, reducing the availability of cover for fish, and reducing the input of food from terrestrial sources. Removal of less than one-half acre of riparian vegetation is not expected to affect water temperature because the scale of shade removal will be too small to overcome more influential factors that affect water temperature, such as water releases from Shasta Dam, and thermal loading along river reaches with high width-to-depth ratios.

Effects related to loss of riparian vegetation and shaded riverine aquatic habitat (SRA) will be minimized by limiting the amount of riparian vegetation removal to access sites and embankment fill, and replacing lost vegetation by replanting the project site with native riparian species at a 6:1 ratio. Additionally, to minimize the permanent loss of 0.36 acres riverine habitat Caltrans will purchase a 2.16 acre parcel of riverside land with stipulations that the parcel never be protected with revetment so that natural riverine processes, including recruitment of LWD will occur.

Because the area is dominated by shrubs and willows, most of the existing habitat features should be replaced in ten years. Any species utilizing the action area during this recovery period may encounter a small reduction in overhead cover and food production. Because of the diverse habitat conditions in the action area, other habitat elements, including pools and riffles, provide cover and food for juvenile salmon and will probably prevent the loss of riparian habitat from contributing to a reduction in the number of individuals, or a redistribution of rearing and migratory characteristics.

IV. CONCLUSION

Upon review of the effects of the Ord Ferry Road Bridge Seismic Retrofit Project, NOAA Fisheries believes that the project will result in temporary adverse effects to the EFH of Pacific salmon protected under the MSA.

V. EFH CONSERVATION RECOMMENDATIONS

Considering that the habitat requirements of fall-run within the action area are similar to the Federally listed species addressed in the preceding biological opinion, NOAA Fisheries recommends that Terms and Condition 1a, 2a, 3a, 4a, and 4b, as well as the Conservation Recommendations in the preceding biological opinion prepared for the Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley steelhead ESUs be adopted as EFF Conservation Recommendations.

Section 305(b)4(B) of the MSA requires FHWA to provide NOAA Fisheries with a detailed written response within 30 days, and 10 days in advance of any action, to the EFH conservation recommendations, including a description of measures adopted by FHWA for avoiding, minimizing, or mitigating the impact of the project on EFH (50 CFR ' 600.920[j]). In the case of a response that is inconsistent with our recommendations, FHWA must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NOAA Fisheries over the anticipated effects of the proposed action and the measures needed to avoid, minimize, or mitigate such effects.

VI. LITERATURE CITED

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